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Europe.....	8.7	per cent. by decade
Asia.....	6	" " " "
Africa.....	10	" " " "
Australia and Oceanica.....	30	" " " "
North America.....	20	" " " "
South America.....	15	" " " "
Total.....	8	per cent. by decade

With this ratio of increase as a basis, the figure 5,994,000,000 will be attained A. D. 2072, or in about 181 years.

It is a curious fact that this is very nearly the same date when, according to the geologists, the coal supply of Great Britain, which gives her prestige among nations, will be exhausted.

Our great-grandchildren will have reason to reflect upon the future and the fate of their posterity doomed to struggle for life under the hard conditions that may be summarized in these words: want of combustibles and room upon the face of the earth. (*L'Anthropologie*, Tome II, No. 6, p. 753.)

PROCEEDINGS OF SCIENTIFIC SOCIETIES.

Association of American Anatomists.—The fourth annual session was held September 23 to 25, 1891, at Washington, D. C. The officers for 1890-'91 were: Joseph Leidy, M. D., LL.D. (deceased), Philadelphia, Pa., President; Frank Baker, M. D., Washington, D. C., 1st Vice President and Acting President; Faneuil D. Weisse, M. D., New York City, 2d Vice President; D. S. Lamb, M. D., Washington, D. C., Secretary and Treasurer. **EXECUTIVE COMMITTEE:** Harrison Allen, M. D., Philadelphia, Pa.; Burt G. Wilder, M. D., Cornell University; Thomas Dwight, M. D., LL.D., Harvard University, President and Secretary, ex-officio; Mr. Fred. A. Lucas, of Washington, D. C., Delegate to the Congress; D. K. Shute, M. D., of Washington, D. C., Alternate.

Wednesday, September 23.—1. Opening of the session by the Acting President. 2. Report of Executive Committee. 3. Report of Secretary and Treasurer. 4. Election of new members. 5. Report of Committee on anatomical Nomenclature. 6. Proposed amendment to Constitution abolishing dues and substituting assessments. **DR. ALLEN.** 7. Proposed amendment to Constitution providing for Honorary Memberships, to apply more especially to foreign anatomists. **DR. LAMB.**

8. Miscellaneous business. 9. Resolutions and remarks upon the death of DR. LEIDY. Papers Read.—1. The fundamental principles of anatomical nomenclature. DR. BURT G. WILDER, Cornell University. 2. The systematic use of the eye in teaching anatomy. Accompanied by a demonstration of a brain model. DR. WM. P. CARR, Washington, D. C. 3. Some impressions on the teaching of anatomy to medical students. DR. HARRISON ALLEN, Philadelphia, Pa. [Discussion opened by DR. DWIGHT, followed by DR. BAKER.] 4. The fossa prænasalis. DR. THOMAS DWIGHT, Harvard University. 5. Notes on the hearts of certain animals. IDA HYDE, Chicago, Ill. [Read by DR. S. V. CLEVINGER, Chicago, Ill.]

The members of the Association and their families were invited by the Acting President, Dr. Frank Baker, to visit, after the Wednesday morning session, the National Zoological Park.

Thursday, September 24.—Miscellaneous Business: Papers read. 6. Recent fissural diagrams. DR. BURT G. WILDER, Cornell University. 7. The arrangement of the supracerebral veins in man, as bearing on Hill's theory of developmental rotation of the brain. DR. WM. BROWNING, Brooklyn, N. Y. 8. Morphological importance of the membranous or other thin portions of the parietes of the encephalic cavities. DR. BURT G. WILDER, Cornell University. 9. The alleged lateral orifices, communications of the fourth ventricle with the sub-arachnoid space. Are they natural? DR. BURT G. WILDER, Cornell University. [Being a reply to part of DR. F. W. LANGDON's paper, "Homology of cerebro-spinal arachnoid with the other serous membranes." Read at the Boston meeting in 1890. Published in *Medical Record* Aug. 15, 1891, p. 177.] 10. The structure of basis and cement substance. DR. CHARLES HEITZMANN, New York City. 11. Serial fetal sections. Specimens and remarks. DR. W. W. GRAY, Washington, D. C. 12. The teeth of the Chiroptera. DR. HARRISON ALLEN, Philadelphia, Pa. 13. Specimens of supernumerary digits in man and the pig. DR. F. J. SHEPHERD, Montreal. 14. The relative frequency of the psoas parvus muscle in the colored race. DR. E. A. BALLOCH, Washington, D. C. 15. Certain modifications in plant morphology, produced by external conditions. DR. W. P. WILSON, Philadelphia, Pa. 16. Comparative osteology of the North American Pygopodes. DR. R. W. SHUFELDT, Washington, D. C. 17. The supracondyloid process in man. DR. D. S. LAMB, Washington, D. C. 18. Platycnemid tibias. DR. FRANK BAKER, Washington, D. C. 19. History of anatomy as a science. DR. G. W. WEST, Washington, D. C. 20. Congenital union of the quadrate jugal to the mandible in a

cockatoo. Specimens and remarks. MR. FRED. A. LUCAS, Washington, D. C. 21. Homologies of the principal bones. MR. FRED. A. LUCAS, Washington, D. C. Friday, September 22. 1. Election of officers for 1891-93. Election of Delegate and Alternate to the Congress. Election of one member of Executive Committee. 4. Miscellaneous business.

Natural Science Association, of Staten Island.—*January* 9th, 1892.—The following paper, illustrated by maps and specimens, was read by Mr. Arthur Hollick:

On the 4th of April, 1881, Dr. N. L. Britton read a paper before the New York Academy of Sciences on the geology of Richmond County. This paper was published in the *Annals of the Academy*, vol. ii, No. 6, and in it the prediction was made that Cretaceous clays would be found beneath the drift to the South and East of the Archæan Ridge wherever this covering of the drift might be removed. At that time Dr. Britton used the following words: "No fossil leaves or shells have been taken from the clay of Staten Island, but it is not improbable that they will be found at some future time, when the excavations are more advanced than at present. They are more likely to be found in buff or dark colored clays than in fire clay."

All subsequent geologists followed on the same lines, and on all geological maps of this vicinity the existence of Cretaceous strata on the south side of the Island is indicated. The actual knowledge upon which this assumption was based was, however, very fragmentary and unsatisfactory. The only known exposures of Cretaceous clay were at Kreischerville and in a ravine at Princes Bay, and how far these extended was not known. Nevertheless, every observant geologist knew what ought to be, and took it for granted that Dr. Britton's conclusions were correct.

Definite evidence in regard to the subject has been slowly accumulating, and especially during the past three months, important facts have come to light. Some of these facts were recorded by me at the time of discovery in our Proceedings. Others have never been placed on record. Following is a brief review of their sequence:

In June, 1883, a single cast of a large shell was found by Mr. W. T. Davis on the surface of a sandy field at Tottenville. It was identified by Prof. R. P. Whitfield, of the American Museum of Natural History, as *Pachycardium burlingtonense* Whitfield; but its significance was not realized by us, and it was regarded as most likely to be an accidental stray.

In November of the same year I picked up on the shore at Tottenville a few blocks or concretions of ferruginous sandstone, containing fragments of vegetable remains, evidently similar to specimens previously found at Keyport, N. J., and Glen Cove, Long Island. The identity of these was at once noted by Dr. Britton, and they were declared, almost with certainty, to be of Cretaceous age. (See Proceedings, Nov. 10 and Dec. 8, 1883.)

In November, 1885, fossil vegetable remains were found in one of the clay beds at Kreischerville. They were too fragmentary for determination, but were apparently identical with similar remains from the Amboy clays. (See Proceedings, Dec. 12, 1885, and Feb. 13, 1886.)

During the Autumn of 1888 a single fossil leaf was found by Mr. Gilman S. Stanton in a block of ferruginous sandstone at Arrochar, which fortunately came to my attention and was kindly turned over to me. As in the case of the *Pachycardium* found at Tottenville, however, its importance was not realized at the time, and the opinion was expressed by me that it was probably of Drift origin. (See Proceedings, Dec. 8, 1888.)

Outcrops of what was apparently Cretaceous clay and gravel were next discovered on the shore and in the ravine at Princes Bay, on the shore at Eltingville, and in a gravel pit on the North side of the Fingerboard road at Clifton. (See Proceedings, March 14, April 11, May 9, and Oct. 10, 1889.)

In the meantime the material from Tottenville was accumulating, some of the specimens being in far better condition than those at first discovered, so that they could be accurately studied and the species of plants determined, leaving no question as to their Cretaceous age. All the organic remains thus far found were vegetable; no animal remains having been even indicated, if we except the single *Pachycardium* previously mentioned.

On May 1, 1889, Dr. N. L. Britton and myself were exploring the clay beds along the Raritan River, at Perth Amboy, where we found ferruginous sandstones and concretions containing molluscs, but in all other respects identical with the leaf-bearing concretions from the shore at Tottenville. This encouraged us to believe that careful search on Staten Island would probably yield similar results, and such has been the case.

In October, 1891, I found molluscs in the concretions at Tottenville, and immediately afterwards at Arrochar. These and the ones from Perth Amboy were submitted to Prof. Whitfield and by him identified as Cretaceous species.

Finally, in November, 1891, I found well preserved fossil leaves of undoubted Cretaceous species on the shore at Princes Bay, in concretions in all respects similar to those from Amboy, Tottenville and Arrochar.

Following is a list of the molluscs, as far as they have been identified:

Corbula sp. ? (possibly a new species) Perth Amboy.

Terebratella vanuxemi Lyell and Forbes, Tottenville.

Pachycardium burlingtonense Whitfield, Tottenville.

Cardium (*Criocardium*) *dumosum* Conrad, Arrochar.

Ostrea plumosa Morton, (?) Arrochar.

Aphrodina tippana Conrad, or *Callista delawarensis* Gabb, Arrochar.

Gryphæa sp. ? Arrochar.

In addition to the above there are several species which are not in a sufficiently good state of preservation for determination. Of the vegetable remains the commonest species is *Liriodendron simplex*, Newb. *Protæoides daphnogenoides* Heer, *Eucalyptus genitzi* Heer, and other characteristic Cretaceous plants are represented, besides a number more, among which there may prove to be undescribed species. This material will be the subject of further study.

With the foregoing facts in our possession we are now in a position to feel reasonably sure that the prediction of the existence of Cretaceous strata beneath the Drift in the towns of Westfield and Southfield has been verified, but other points of interest yet remain to be discussed. The first of these is in regard to the character of the rock in which the organic remains are found. Its concretionary nature is apparent—the nucleus in all cases having been a mass of clay in which is enclosed the mollusc or leaf, as the case may be. Limonite often forms as a succession of layers over the outside and the clay is gradually transformed into a hard clay iron-stone. A large series of specimens collected show every stage in the process of formation, from soft clay to hard rock. In the softer material some of the carbon of the vegetation may yet be seen, but in the hard rock nothing except the impressions of leaf or stem remains. Finally, the question will naturally be asked, are these fossils in place where found? Some doubt was felt in regard to the specimens from Tottenville and Princes Bay, inasmuch as they were evidently washed out of the banks, the mass of which is composed of Drift material, in places enclosing considerable clay and yellow gravel. This is conspicuously the case at Princes Bay, as noted by Dr. N. L. Britton in the Proceedings of

November 8, 1884, and a deep talus, extending to the beach sands, has nearly always covered the base of these bluffs, so that the character of the material at the shore level could not be ascertained. Recent excavations at Arrochar have greatly helped in the solution of the problem, however, and I was fortunate in arriving there when a section was freshly exposed. This section showed at its base a bed of sandy micaceous clay, containing the characteristic ferruginous concretions, lying flat in the plane of the bedding. The next member was a bed of yellow sand and gravel, also containing concretions. The concretions containing the specimens of *Cardium dumosum* were dug by me out of these layers of clay and sand, and in the gravel I found silicified corals, so characteristic of the yellow gravel which overlies the Cretaceous clays in New Jersey. Above these beds, and conformable with them, there is about four feet of modified drift, the entire series dipping at an angle of about forty degrees towards the N. W. Boulder drift covers the surface. That these beds have been subjected to considerable disturbance is evident from the position in which we now find them, and the stratigraphy of the subject would be an interesting matter for future investigations. It is highly probable that these isolated and limited exposures represent a large and probably continuous bed of Cretaceous strata underlying the entire region, as previously predicted.

Boston Society of Natural History.—November 18th.—The following papers were read: Dr. George Baur, A Visit to the Galapagos Islands; Prof. W. M. Davis, The Catskill Delta in the post-glacial Hudson Estuary.

December 2d.—The following papers were read: Prof. A. Hyatt, Relations of Ancient and Modern Pinnas; Dr. C. S. Minot, Recent Investigations on the Brain.

A general meeting was held in commemoration of late officers of the Society, Wednesday evening, December 16th, at 7.45 o'clock.—The following communications were made: Dr. J. C. White, Sketch of the Life of D. Humphreys Storer; Mr. Samuel Garman, Dr. Storer's Work on Fishes; Mr. S. H. Scudder, The Services of Edward Burgess to Natural Science; Dr. B. Joy Jeffries, Mr. Burgess' application of Science in naval Architecture, illustrated by stereopticon views of yachts and the international races; Profs. G. L. Goodale, C. S. Minot, and N. S. Shaler, In Memory of Samuel Dexter.

January 6th.—The following papers were read : Mr. Percival Lowell, Shinto Occultism from a Scientific Standpoint ; Prof. E. S. Morse, On the Form of the Ancient Bow in Various Parts of the World.

January 20th.—The following papers were read : Dr. Charles V. Riley, Life History of *Sphæcius speciosus*, Drury ; Notes on Caprification ; Mr. S. H. Scudder, The Tertiary Weevils of North America.

Biological Society of Washington.—November 28.—The following communications were read : Dr. George Marx, On the Structure and Construction of the Geometric Spider Web ; Mr. Charles D. White, Some Peculiar Forms in an Upland Carboniferous Flora ; Prof. F. H. Knowlton, Fruiting Ferns from the Laramie Group ; Mr. Frederick V. Coville, Review of Kuntze's *Revisio Generum Plantarum* ; Dr. C. W. Stiles, Notes on Parasites—*Spiroptera scutata*.

December 12th.—The following communications were read : Mr. Frederick V. Coville, Review of Kuntze's *Revisio Generum Plantarum* ; Mr. E. M. Hasbrouck, Remarks on Dichromatism ; Prof. Lester F. Ward, Recent Discoveries of Potomac Fossil Plants near Washington.

December 26th.—The following communications were read : Prof. E. H. Knowlton, A Fossil Bread Fruit Tree from the Sierras of California ; Prof. Lester F. Ward, Alphonse de Candolle on the Transmission of acquired Characters ; Prof. B. T. Galloway, A New Pine Disease ; Dr. C. Hart Merriam, Remarks on the Affinities of the North American Squirrels, Chipmunks, Spermophiles, Prairie Dogs and Marmots.

January 23d.—The following communications were read : Dr. C. W. Stiles, Notes on Parasites ; *Myzonimus* gen. nov. ; Mr. Theo. Holm, Studies of the Morphological Identity of the Stamens ; Dr. Theobald Smith, On Peculiar Forms of Red Corpuscles in Mammalia in Anæmic Conditions.—FREDERIC A. LUCAS, *Secretary*.